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(54) Abstract Title
Telephone based payment system

(57) A generic payment system is based on the use of mobile 'phones and a payment server which stores details of a donor account and a beneficiary account, each account being identified by an account number. When a payment is to be made, the donor (who is going to make the payment) uses their mobile telephone to set up a communications link, via a mobile network, to the payment server. The Calling Line Identity of the donor's telephone is passed to the server to uniquely identify or authenticate the telephone to the server. Information enabling a transaction between the donor account and the recipient account is then sent over the communications link to the server. The server may optionally contact the beneficiary, using their mobile telephone, to inform them of the payment. In alternative embodiments the authentication of the donor or the donor's telephone may be achieved by transmission of a Personal Identification Number or a voice print.

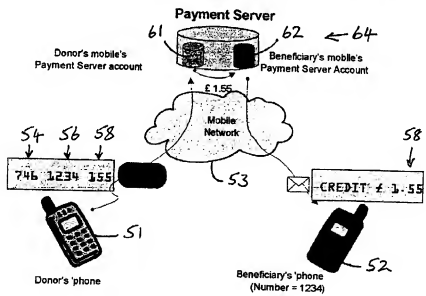

FIGURE 2

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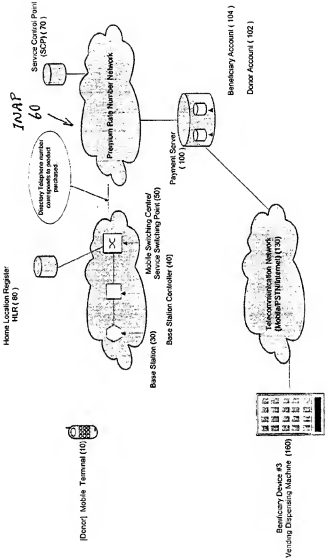
Service Control Point (SCP) (10)
INAP
60
Premium Rate Number Network
Gateway Telephone number corresponds to product inventory
Home Location Register HLR (40)
Mobile Switching Control Service Switching Point (50)
Base Station Controller (40)
Payment Server (100)
Beneficiary Account (104)
Donor Account (102)
Base Station (30)
Telecommunications Network (Mobile/PSTN/Internet) (130)
[Donor] Mobile Terminal (10)
Beneficiary Device #3 Vending Dispensing Machine (160)

FIGURE 1

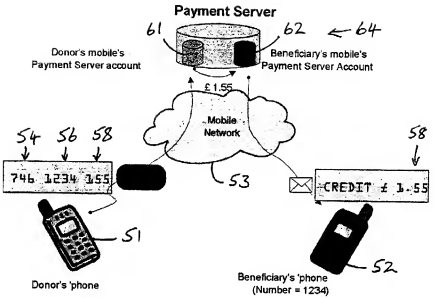
Payment Server
61
62
64
Donor's mobile's Payment Server account
Beneficiary's mobile's Payment Server Account
£1.55
Mobile Network
54
56
58
58
746 1234 155
53
CREDIT £ 1.55
51
52
Donor's 'phone
Beneficiary's 'phone (Number = 1234)

FIGURE 2

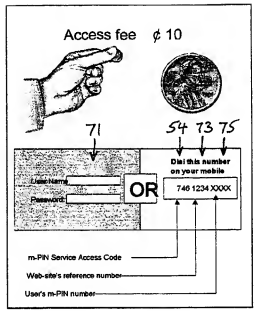

FIGURE 3

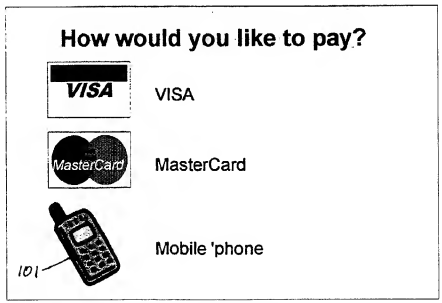

FIGURE 7

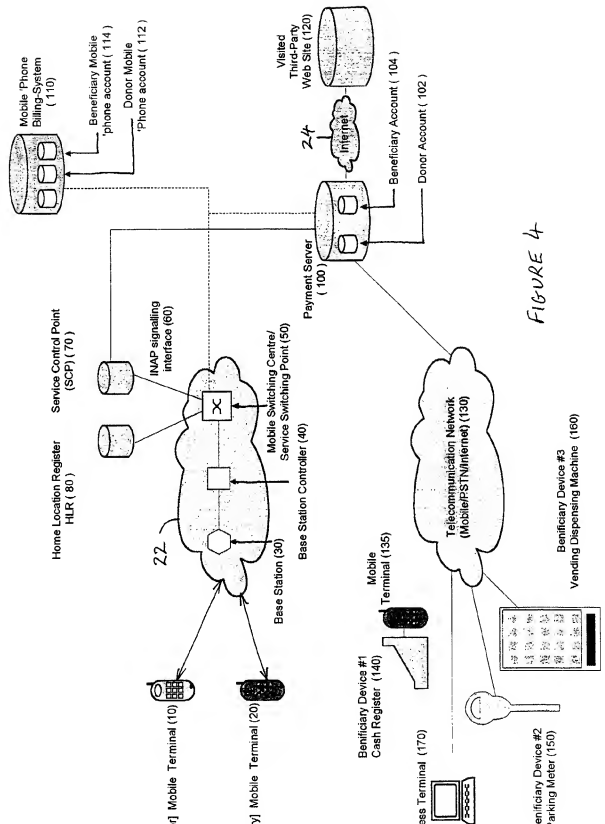
Mobile Phone Billing System (110)
Beneficiary Mobile Phone account (114)
Donor Mobile Phone account (112)
Visited Third-Party Web Site (120)
24
Internet
Beneficiary Account (104)
Donor Account (102)
Payment Server (100)
Home Location Register HLR (80)
Service Control Point (SCP) (70)
INAP signalling interface (60)
Mobile Switching Centre/ Service Switching Point (50)
Base Station Controller (40)
22
Base Station (30)
[Donor] Mobile Terminal (10)
[Beneficiary] Mobile Terminal (20)
Mobile Terminal (135)
Telecommunication Network (Mobile/PSTN/Internet) (130)
Benficiary Device #1 Cash Register (140)
Beneficiary Device #3 Vending Dispensing Machine (160)
Internet Access Terminal (170)
Beneficiary Device #2 Parking Meter (150)

FIGURE 4

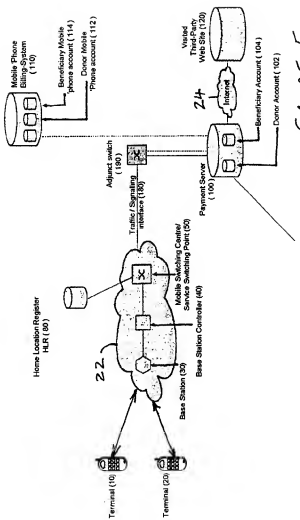

FIGURE 5

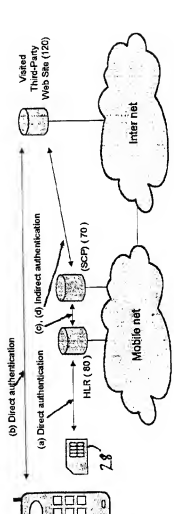

FIGURE 6

Telephone based payment system.

1 Background

1.1.1 Ubiquitous powerful personal telephones

The invention relates to a telephone-based payment system, and in particular to a mobile telephone based micro payment system.

Mobile 'phones have become ubiquitous in modern society. Many users carry and rely upon their mobile 'phone as much as a wristwatch or wallet. Moreover contemporary mobile 'phones contain almost as much computer (CPU) power as many PCs. These facts have led some commentators to argue that mobile 'phones will become a commonplace method of accessing the Internet and thus of making transactions.

1.1.2 Mobile Internet

The mobile telecommunications industry has catered to this demand, amongst other ways, by the development of "mobile Internet" i.e. simplified versions of the original wireline based Internet designed to accommodate the limited display screen size and limited communication bandwidth between the 'phone and the network. WAP (Wireless Application Protocol) is the best known of the mobile Internet standards. Mobile Internet follows the same principles as regular Internet namely that information is published on a Web site / WAP-site and any one with a compatible Web / WAP browser can access this site over the Internet. As happens on the fixed Internet

users may make purchases or other financial transactions over the Mobile Internet.

However while mobile Internet follows the same general philosophy as fixed Internet there are important differences that limit its utility and therefore likely uptake. WAP is not compatible with HTML (the language of the fixed Internet) and therefore WAP 'phones cannot access any of the vast number of existing HTML based sites and a selling Merchant must create and publish a WAP site. Moreover many existing subscribers do not currently have WAP capable 'phones and even on those 'phones that do offer WAP, the user may have to have substantial skill and patience to use it. It can be complex, tedious and cumbersome to navigate through the 'phone's menu functions to locate and select the WAP option, establish a dial-up connection, recall or search for the target WAP site address, browse to that site, locate the product in question and then browse to the payment page, enter payment details etc.

1.1.3 Premium Rate numbers/Automatic Vending

Another well-known approach to telephone based commerce is the use of Premium Rate telephone numbers. These operate by charging a premium tariff for calls made to selected numbers e.g. to a stock market information service. This premium call tariff is charged to the caller's telephone bill and collected by the telephone network operator and the revenue for this call is split between the telephone company and the called party, i.e. the provider of the telephone information service. The advantage of this system is that it is very simple and

especially that the Merchant who provides the telephone information service does not need to have a billing relationship with the end-user.

Premium Rate numbers were originally used in general purpose telephone applications i.e. a Premium Rate information service could be called either from a fixed or a mobile telephone. More recently Premium Rate based services have been provided targeting only mobile users. These are used to provide Automatic Vending applications.

The known Automatic Vending approach using Premium Rate numbers is illustrated in figure 1, and operates as follows. Each item in the vending machine 160 is given a different premium rate telephone number. The tariff rate for the premium rate call is set to correspond to the price of the item. To purchase the item the user dials the number on his mobile terminal 10. The number connects to a central facility that communicates with the vending machine and instructs it to dispense the item. The mobile 'phone user incurs the cost of the premium rate telephone call. The mobile Operator collects the charges for this bill from the user and passes the cost of the premium rate call to the Operator of the Premium Rate telephone. The Premium rate Operator remits to the Vending Machine Operator the price of the item purchased.

While it would be technically possible to purchase an item from an automatic Vending machine from a fixed 'phone this would be unlikely in practice because there may not be a fixed 'phone close to

the Automatic Vending machine and if there were the person responsible for the 'phone bill may be unwilling to bear the cost of the items purchased.

Two of the key feature of the Premium Rate number approach are that:

- The service may be implemented independently of the Mobile Network Operator i.e. without their consent or co-operation.

- There is a fixed correspondence between the Premium Rate telephone number and the amount payable.

1.1.4 Intelligent Network Technology

Premium Rate telephone number services are often implemented using Intelligent Network techniques. This section gives a brief summary of Intelligent Network using the same reference numerals as in figure 1.

An "Intelligent Network" is one where the processing of a telephone call can, to a limited extent, be controlled by an external computer called a Service Control Point (70). The elements of an Intelligent Network are the Service Switching Point SSP 50, which physically connects the call, and the Service Control Point 70, which in some circumstances, governs the destination to which the call is connected. The SSP and the SCP are connected by a defined interface protocol (60) called the Intelligent Network Application Part. Not all calls processed by the SSP will be referred to the SCP, only those that satisfy various triggering criteria. Calls to the SCP may be triggered by a number of conditions including: the identity of the caller, the number

dialled by the caller etc. Intelligent Network architectures are commonly used to implement "digit translation" services such as Premium Rate, Freephone, Corporate Numbering Plans, etc. In a standard Telephone call the cost of the call is based on the called number, the time of day and the length of the call. The Intelligent network allows the call to be tariffed on other factors. For example, Premium Rate allows the cost of the call to be based on the value of the information accessed rather than simply the cost of the telephone connection and Freephone allows the cost of the call to be charged to the called party rather than the calling party. In the case of the Premium Rate service the originating telephone exchange (known in the art as the Service Switching Point or SSP) analyses the dialled digits and recognises the first few digits of the dialled number as those of a Premium Rate 'phone number. This triggers a request via the Intelligent Network Application Part (INAP) signalling protocol to the separate computer known as the Service Control Point (SCP). The request contains the Identity of the Calling telephone Line (Calling Line Identity, CLI), and the digits dialled by the user. The SCP consults its database and translates the Premium Rate number dialled by the user into the geographic telephone number of the physical location of the destination. It returns this new telephone number to the SSP and instructs it to out dial that number. It also instructs the SSP to modify the Call Details Record produced by the SSP to indicate that the call should be charged at a Premium Rate.

1.1.5 SIM Application Toolkit Technology

Another technique used to make payments from mobile 'phones is the use of SIM Application Toolkit (SAT) technology. This like WAP is based on the client-server computing paradigm but rather than employing client software in the handset it employs client software in the SIM card. The SIM card is a microprocessor-based secure smart card and is used inside all GSM mobile 'phones. The original and primary purpose of the SIM card is to stores confidential subscriber account information securely and to encrypt and exchange this information with the mobile 'phone network at the start of each call. This secure exchange of identity information allows the cost of the call to be debited from the correct account. SAT can exploit the fact that the SIM is a standalone microprocessor, independent of the mobile 'phone in which it is installed, and the fact that the SIM can provide security services, authentication and encryption of data. SAT extends the basic capabilities of the SIM card by allowing small software applications, e.g. an online banking application, to be downloaded to the SIM. The user selects a SAT option from a menu or special button on their 'phone and then selects, for example, the online banking service from the list of installed SAT applications. The user may then perform a banking transaction e.g. transfer funds between accounts, and the SIM card will send this transaction instruction through the mobile network to the banking application server. This transaction instruction is encrypted using the SIM card's encryption capabilities. The main advantage of this system is that the SIM card communicates in a secure link directly with the bank server. The bank can thus be

confident that only authentic, authorised users can perform transactions and that these users cannot repudiate any transactions they have actually made.

1.1.6 Transferring Billing Records from other systems.

Most phone networks have billing arrangements with other domestic and foreign networks. A mobile phone network may be directly connected to other fixed and mobile networks in the same country. When a user on one network calls a user connected to another network, the call is handed over at an interface between the networks. Both the originating and terminating networks receive payments for handling their part of the call. The terminating network bills the originating network and the originating network bills the calling user. The billing mechanism between the Operators is normally in the form of a tape or file of Call Detail Records.

Similarly most mobile phones have billing arrangements with foreign or international mobile 'phone companies. Many contemporary digital mobile cellular systems are internationally standardised and may be used in many different countries. This international usage requires both technical and commercial prior arrangements.

As well as providing a common air-interface standard, the technical standardisation bodies (e.g. ETSI, GSM) have also defined technical procedures that allow users "roaming" abroad to be authenticated and to have records of calls (Call Detail Records) to be sent back to the user's Home network. The user's home network operator may then

calculate the cost of the calls made and add these charges to the user's bill.

The authentication mechanism is that the Home network can forward a series of "authentication triplets", which are in effect a set of one-time-use passwords. In this way, the Home network supplies a series of "Challenges" and pre-calculated expected correct "Responses". The visited network challenges the roaming mobile with the Challenge supplied by the Home Network and if the mobile replies with the correct expected response then it is deemed to be authentic. The Visited network may then allow the call to proceed. There are also additional mechanisms used for users who have "pre-paid" accounts. These mechanisms require a more real-time contact between the visited and Home network, to ensure that the would-be caller still has sufficient credit in their pre-paid account before the call is permitted to begin.

At the end of a suitable billing interval (this might be either hours or weeks) the Operator of the visited network collects the Call Detail Records of calls made by visiting roaming users and despatches these to their respective Home Operators.

The billing systems of the Home cellular operators are designed to accept these roaming billing records and to add the charges to the user's bill.

To date these roaming billing mechanisms have been used only for the settlement of international (or domestic) roaming calls.

2 The Invention:

2.1 Overview

The invention provides in its various aspects a telephone payment apparatus and method as defined in the appendent claims, to which reference should now be made. Preferred or advantageous features of the invention are defined in dependent subclaims.

The invention may thus advantageously provide a Generic Payment System based on using digital mobile 'phones such as those employing the GSM standard. The 'phone may be a basic handset or employ special capabilites such as WAP or those found on a mobile Personal Digital Assistant (PDA).

Embodiments of the invention will now be described by way of example with reference to the drawings, in which;

Figure 1 shows a.prior art system for payment using premium numbers;

Figure 2 shows a payment system according to a first embodiment of the invention;

Figure 3 shows a web page for making a payment according to a further embodiment of the invention;

Figure 4 shows a payment system according to a further embodiment of the invention;

Figure 5 shows a payment system embodying a further embodiment of the invention incorporating an adjunct switch;

Figure 6 illustrates direct and indirect authentication in a payment system embodying the invention; and

Figure 7 illustrates a web page offering a choice of payment methods, including mobile phone payment.

The following example, as shown in figure 2, illustrates one aspect of the invention. The embodiment allows one mobile 'phone user (the donor) 51 to pay another (the beneficiary) 52 by dialling over the mobile phone network 53 the following:

- a Payment- Service Service-Access-Code 54 and,
- the beneficiary's mobile telephone number 56, and,
- an amount to be paid 58 and,
- an (optional) PIN number (personal identification number).

This action debits the sum from the donor's account 61 and credits it to the beneficiary's account 62. Both the Donor's and Beneficiary's accounts may be either their existing mobile 'phone account or their optional standalone account on a Payment Server 64.

This embodiment works as follows. Rather than employing client software in the 'phones themselves, as WAP and SAT do, the embodiment employs intelligence in the network. When the mobile

telephone network analyses the dialled number to decide how to route the call to its destination, it recognises the first three digits, e.g. 729 (PAY) or 746 as a Service Access Code and "triggers" a request to a Payment Server. The request includes the digits dialled i.e. identifying the intended Beneficiary such as their telephone number or account number, the sum payable and optionally a PIN number. The request also includes the Calling Line Identity of the calling mobile 'phone. The Payment Server verifies that the PIN number (if present) is correct and if so transfers the specified amount of money from the Calling Party's Account to the Beneficiary's Account. The Payment Server can also be configured to send the Beneficiary a Short Text Message (SMS) or Voice Clip to verify that the payment has in fact been credited to their account.

Figure 3 illustrates a second embodiment of the Invention. The embodiment allows a mobile 'phone user simultaneously to log onto a web site and to pay a (probably small) sum of money, for access to the web site. The embodiment provides an alternative to the traditional method of entering a user-name and password 71 to log onto a site, and enables a payment to be made. As shown in figure 3, the web site displays the Payment System Service Access Code (e.g. 729 or 746) 54, a reference number for that Web site 73 and optionally a placeholder 75 for the user's PIN number. When the user dials this number on their mobile 'phone, the mobile telephone network analyses the dialled digits and identifies the first three digits, e.g. 729, as the Payment System Service Access Code and triggers a request to the Payment

Server. This request contains the caller's own telephone number (Calling Line Identity), the Web site reference number and optionally the caller's PIN number. The Payment Server then checks the caller's credit and if sufficient transfers the money from the caller's account to the web-site account. It then uses the Web site reference number to identify the target web site and to inform it of the caller's identity, that the caller is authentic and that the money has been credited to the Web site's account.

This approach has advantages over the conventional user-name/password method, including the following:

- The user does not need to remember multiple individual user-names and passwords for individual Web sites but can access all participating Web sites with their mobile 'phone and a single PIN number.

- It allows the log-on to be simultaneously combined with the payment of a small sum of money, which is debited from the Caller's mobile 'phone account or independent Payment System Account.

Some of the key features of this aspect of the Invention, which can be appreciated from these embodiments, are:

- It operates with basic mobile 'phone handsets and does not require the use of advanced second or third generation SAT (or STK) / WAP / UMTS handsets.

- It is a generic payment mechanism which allows payments to be made to an arbitrary destination and of an arbitrary amount. This contrasts with premium rate based methods that offer payments of fixed amounts to fixed beneficiaries.

- It may be used in both online and offline situations.

2.2 Further Detailed Description

Further aspects of the Invention will now be described in more detail with the aid of figure 4 where the following elements are illustrated:

2.2.1 Elements illustrated in figure 4

(10) and (20) are mobile 'phone terminals. Users use these to access the mobile 'phone network 22, make and receive telephone calls, access data services, send and receive short text messages etc.

The mobile 'phone terminals access the mobile 'phone network. The purpose and function of each of the elements of this network are well known to those familiar with the art. These are summarised briefly below. The mobile network comprises radio Base-Stations (30), Base Station Controllers (40) and a Mobile Switching Centre (50). The MSC (50) is also configured to act as a Service Switching Point SSP (50). The Base-stations (30) and the Base Station Controller together provide and control all radio transmission features. The Mobile Switching Centre controls call set-up and routing. A Home Location Register HLR (80) is a database storing subscribers' details notably each subscriber's location allowing incoming calls to be delivered to subscribers.

(70) is a Service Control Point (SCP). This is a standard element of an "Intelligent Network". It is a computer, which can under certain conditions control the processing of a telephone call by the Service Switching Point (50). The Service Control Point (70) is linked to the Service Switching Point (50) by an Intelligent Network Application Part (INAP) signalling interface (60).

(100) is the Payment Server. This contains multiple accounts for different users and has the means to transfer funds between different accounts. The Payment Server is coupled to the mobile network and also to the internet 24, and has a Web based user interface allowing any user with a web browser to configure options for their account e.g. whether a PIN must be entered for each transaction or a threshold level above which a PIN must be entered or whether the Payment Server should employ a two stage process with the user entering the details, the Payment Server echoing these back and the user then indicating acceptance by entering a PIN. The Payment Server also interacts with other web sites which the user is logging onto with their mobile phone.

(110) is the Billing System of the mobile 'phone network. Each time the MSC/SSP (50) originates a call it creates a Call Detail Record (CDR) recording e.g. the dialled number, the call start time, the call end time etc. The Billing System (110) periodically collects these Call Detail Records (CDRs) and rates each call i.e. decides how much to tariff for each individual call. The tariff for a call is typically based on the dialled number (national, international), the time of day and the duration of the call. The tariff for the call may also be based on

supplementary information inserted into the Call Detail Record by the Service Control Point (70). The SCP via the INAP interface has the ability to both modify and to add supplementary information to the CDR.

(120) is a web site that is independent of the mobile network or the Payment Server, which a user may pay to visit as described with reference to figure 3.

(130) is a Telecommunication Network. This may be either a mobile network, a PSTN, an ISDN or an Internet. This provides a communication channel between the Payment Server (100) and the Beneficiary Device. (140, 150, 160).

140 is a device which may receive payment, e.g. a Cash Register (140), 150 is a second device which may receive payment e.g. a Parking Meter (150) and 160 is a third device which may receive payment such as a vending dispensing machine.

2.2.2 Making a payment between two mobile 'phones

The operation of this embodiment of the Invention will now be described. In the embodiment, in order for one user to make a payment to another the procedure is as follows. The Donor user dials a number composed of the following elements:

- A Payment Service Access Code (e.g. 729).
- the Beneficiary's telephone or account number (e.g. 0123 456 7891),

- the amount payable (e.g. ¢ 1525 i.e. $ 15.25) and

- (optionally) the user's PIN number.

When the user enters and dials this number the Mobile Network authenticates the Mobile Terminal (10) (to be more precise, it authenticates the Subscriber Identity Module inside the Mobile Terminal). This Authentication process proves that the calling mobile terminal (SIM) is in fact the Mobile Terminal (SIM) that it claims to be. This Authentication is vital to ensuring that subsequent Call Detail Records are assigned to the correct user's account.

The numbers dialled by the Donor Mobile Terminal (10) are analysed by the MSC/SSP (50), which identifies the leading digits (729) as a Service Access Code.

In the preferred embodiment, the MSC/SSP (50) then sends a request to the SCP (70) via the INAP (60) interface. This signalling request contains the identity of the Donor Mobile Terminal (its IMSI, or International Mobile Subscriber Identity) and the number dialled by the Donor Mobile Terminal (10). The signalling request also contains and implicit or explicit authentication of the Donor Mobile Terminal (10). The authentication is at least implicit since the MSC/SSP (50) will only forward the request if the Mobile Terminal (10) is authentic. Alternatively the MSC/SSP may explicitly include an authentication field in the message.

The SCP (70) then forwards the request for payment to the Payment

Server (100). The Payment Server (100) then checks that the PIN number (if entered) is correct and if so, if that the Donor (102) has sufficient funds (or sufficient credit) remaining in their account. If so then the Payment Server (100) transfers the funds from the Donor account (102) to the Beneficiary account (104). Alternatively the Payment Server (100), rather than transferring funds between its internal accounts, may check the user's mobile 'phone account balance on either the SCP (70) or the Billing System (110) and instruct the relevant element to transfer funds between the Donor's mobile 'phone account (112) and the Beneficiary's mobile 'phone account (114). As a further alternative the Payment Server (100) may transfer funds between either the Donor's or Beneficiary's account on the Payment Server and the other party's mobile 'phone account (112 or 114) using either the SCP (70) or the Billing System (110) as described previously. The Payment Server (100) may use any of the following alternatives: transfer funds between accounts maintained on the Payment Server (100) itself; transfer funds between an account on the Payment Server (100) and a mobile 'phone account either by using the Billing System or by instructing the SCP to modify the CDR that it produces in order to debit the specified amount from the Donor or to credit this to the Beneficiary; transfer funds between mobile 'phone accounts either by utilising the Billing System or by instructing the SCP to modify the CDR that it produces in order to debit the specified amount from the Donor and to credit this to the Beneficiary

The Payment Server (100) may then send a confirmation message to

the Beneficiary Mobile Terminal (20) using either a text message, e.g. GSM Short Text Message (SMS), or a prerecorded Voice Clip. To provide the Beneficiary with proof/reassurance that this confirmation message has in fact come from the Payment Server, the Payment Server (100) may append a secret Password or PIN number known only to the Beneficiary and the Payment Server. Thus when the Beneficiary receives a Payment Received message containing their secret Password, they can be assured that the message has come from the payment server and not from an impersonator.

A refinement of this idea is to allow the Donor to specify the currency of payment, by entering the international telephone country code for the country in question (e.g. since +33 is the country code for France, '729 1234 +33 15 SEND' means pay user # 1234 15 French Francs).

A refinement of this procedure may be used to prevent "wrong numbers". If the MSC can supply the Identify of the Radio Base station from which the call is being made (Cell ID), then it is possible to configure the service to require that both parties to a transaction are in the same or adjacent cells, or in the same geographic area if a transaction is to be allowed to proceed.

2.2.3 Alternative sequence of entering the numbers.

There are several variations of the way in which the numbers may be entered. The user may configure whichever variation they prefer. The user may dial the Service Access Code only and then await a response (either a voice prompt or a text prompt (via SMS, USSD or WAP))

before entering the rest of the details. A third option is for the user to enter all the details except the PIN number. The Payment Server (100) then echoes the Payment Details back to the Donor Mobile Terminal (10) and the Donor enters their PIN number to confirm the transaction.

2.2.4 Alternative Adjunct based implementation

In an alternative aspect of the Invention, rather than using an IN architecture i.e. with an SSP (50) and SCP (70) and Service Access Code which is detected by the SSP, an external adjunct switch (190) is used.

This approach is illustrated in figure 5 and may be used in circumstances either where the MSC does not have an SSP capability (i.e. the ability to trigger a signalling request to a SCP) or where the Operator of the Mobile network is unwilling to provide this service. In this case the user dials a conventional telephone number e.g. 0900 123 4568 that terminates on a SSP/SCP. Alternatively the user may dial a "star service code" eg. "*729" if the MSC has the ability to recognise "star" numbers and route this to an external telephone exchange which has the equivalent of the SSP/SCP functionality described previously. The user may then enter the number of the Beneficiary, the amount payable and the Donor's PIN number. The external telephone exchange may also provide facilities such as voice prompting to help the user conduct a transaction.

The interface between the mobile network 22 (or an intermediate PSTN/ISDN network) and the Adjunct switch (190) may be either a user-network interface or a network-network interface. If the interface

is a network-network interface i.e. one employing Signalling System No 7 then the Operator of the Adjunct Switch (190) will receive terminating call payments for calls made to the Adjunct Switch (190) / Payment Server (100). This allows the Operator of the Payment Server to in effect receive a transaction fee for providing callers with the ability to pay other users. The caller pays a standard mobile call charge and does not have to pay a premium call charge.

2.2.5 Making a payment to an offline device

A further aspect of the Invention may advantageously allow payment to offline devices such as a Cash Register (140), a Parking Meter (150) or a Vending Dispensing Machine (160). As was described previously there are known methods of Automatic Vending using a mobile 'phone. These use Premium Rate number services and suffer from the drawback that there is a fixed correspondence between the number dialled and the tariff. The present aspect of the Invention may allow complete flexibility for both the Beneficiary and the Amount payable. In a preferred embodiment, to make a Payment to an offline Cash Register (140) the procedure is as follows. The Donor user dials the Service Access Code (e.g. 729), the Identity number of the Cash Register (e.g. 1234), the Amount payable and the donor's PIN number. As described previously the Donor Mobile Terminal (10) is authenticated and the funds transfers to the Beneficiary's Account (either 104 or 114 as appropriate). The Payment Server (100) may then send a Payment Confirmation message via the mobile network to a Mobile Terminal (135) connected to the Beneficiary Device (140). The

Mobile Terminal (135) relays the message to the Beneficiary Device (140). In alternative implementations the Beneficiary Device (150, 160) may be linked to the Payment Server (100) by another telecommunication network e.g. a PTSN, ISDN or Internet.

In a variation of this idea the Beneficiary Telephone passing the Identity of the Base-station from which the call is being made in the INAP signalling message from the SSP to the SCP may shorten the Beneficiary identity number. This simplifies the process for the Donor user. If no Cell Identity Information is passed then the Beneficiary must have a number, which is Nationally unique. On the other hand if Cell Identity information is passed, then the number need be unique only within the area served by that individual Radio Base Station. This allows for shorter Beneficiary Numbers and thus greater user convenience.

To collect a receipt for the transaction, the user of the Donor mobile 'phone may log onto the Payment Server (100) via the Internet and collect a Receipt.

2.2.6 Proxy Authentication

An important feature to notice about this aspect of the Invention is that it incorporates indirect or what might be termed "Proxy" Authentication. This makes the service much more secure than if the service were provided over say a PSTN/ISDN 'phone. This approach allows the security of the mobile network to be exploited by other external systems.

Figure 6 shows both conventional "direct" authentication and the novel form of indirect or proxy authentication. In figure 6 line (a) illustrates a direct authentication of the Subscriber Identity Module (SIM) card 28. Similarly line (b) illustrates a direct authentication between a WAP / HTML browser in the mobile 'phone terminal (10) and a Visited WAP / Web site (120). By contrast lines (c) and (d) show an indirect authentication. The user (SIM) is directly authenticated by the HLR (80), which in turn then either explicitly or implicitly informs the SCP (70) that the user is authentic. The HLR (80) may inform the SCP (70) implicitly simply by permitting the call to proceed (it would do this only if the user were authentic thus implying an authentication). The SCP (70) can then explicitly or implicitly inform the Visited Third party web site (120) or the Payment Server (100) (not shown in figure 6) that the calling user is authentic.

Advantages of this indirect authentication mechanism include the following:

- It is much more secure than using a fixed PSTN/ ISDN 'phone, yet
- It is not as complex as conventional mobile methods. It does not require a special/advanced mobile 'phone, nor does it require complex mobile internet (WAP/CHTML etc) or SAT software in the 'phone / SIM.

2.2.7 Logging onto web sites

Another aspect of the Invention allows users to log onto web sites using their mobile 'phone and PIN number rather than a user name

and password. The operation of a preferred embodiment of this aspect of the Invention is as follows (with reference to figure 4):

1) The User accesses the Internet using an Internet Access Device (170) and web browser. The user browses to a web site (120) which has joined the Payment Server Service. The user's browser downloads the log-on web page onto the user's screen. An example of a Log-on screen is illustrated in figure 3. This web page is composed of various elements one of which is a HTML link to the Payment Server (100).

2) The embedded HTML link in the Log on dialogue page generates a HTTP link to Payment Server. This http request may also carry a cookie from user's Internet Access Device (170). A cookie is a well known technique and comprises a simple text file that contains a unique reference number that identifies an individual user. The cookie was written to the user's Internet Access Device by the Payment Server (100) on a previous visit to the Payment Server.

3) The Payment Server generates a Reference Number for this user's log on request, and

4) Sends this Log-on reference number in a HTML message to the browser on the user's Internet Access Device (170)

5) The browser formats and displays log-on dialogue box (e.g. figure 3)

6) The user dials the Service Access Code, the web site's reference number and their PIN number into their mobile 'phone (10). If the Web site charges a fee for accessing the site then the user may enter the amount payable.

7) The MSC/SSP (50) identifies from the Service Access Code that this is a Payment Server call and triggers a query to the Service Control Point (70). The SCP (70) forwards the subscriber authorisation, the Calling Line ID, the web site reference number etc, to the Payment Server (100).

8) The Payment Server (100) uses the Reference Number to match the incoming mobile call with the web site log on request.

9) If the mobile network has authenticated the user then the Payment Server (100) informs the third party web site (120) that the web-site visitor is accepted and the web site (120) allows the user to log on. Similarly if a fee is payable the Payment Server acknowledges to the Visited Web site that this has been credited to the Web Site's account.

2.2.8 Paying for online goods.

To pay for online goods the procedure is as follows. The user browses using an Internet Access Device (170) to a web site where they decide to purchase goods. On the payment page they are presented with alternative payment mechanisms e.g. as illustrated in figure 7.

If the user selects the pay by mobile 'phone option 101 then they are

presented with a dialogue box that instructs them to dial a number composed of the following elements: The Service Access Code, the Web Site reference number, the Amount payable and the user's PIN number.

As described previously, the Reference Number displayed on the Web site (120) dialogue box is supplied using HTML references by the Payment Server (100).

The user then dials the number indicated. As described above the Service Access Code is detected by the MSC/SSP(50) and triggers a call to the SCP(70). The SCP (70) then contacts the Payment Server (100) which then debits the Donor Mobile Terminal (10) account either (102 or 112) . In either case the Payment Server informs the third party web site (120) that the transaction has been authorised.

2.2.9 Purchasing Lottery tickets

In another embodiment, the Invention may allow the purchase of lottery tickets. The procedure is as follows. The Donor user dials 7295(PAYL) immediately followed by their chosen numbers e.g. 01 12 17 18 20 40 immediately followed by their PIN number.

The user may then be e-mailed a receipt.

2.2.10 Sending business cards

In another aspect of the Invention, the Donor User rather than sending funds may send other information, such as a Business Card. In an embodiment of this aspect of the invention, the Donor dials a different

Access Code say 2273 (for Card) then the Beneficiary's telephone number, and an Optional PIN followed by SEND. As described previously the Service Access Code triggers the MSC/SSP (50) which then passes the dialled number to the SCP (70). The SCP (70) then signals to the Payment Server (100) to send an electronic business card to the Beneficiary's e-mail address or mobile 'phone. (If email is to be used, there is a pre-requisite that the Beneficiary has already registered their e-mail address.)

2.2.11 Integrating with the Mobile Operator's billing system.

In several of the example applications described thus far, the services have been described in the context of a system using a standalone Payment Server (100) i.e. where the Donor and beneficiary have accounts on the Payment Server (100).

It would also be very convenient for many users if the funds could be debited directly from their mobile telephone bill. The conventional method of doing this would be to establish a proprietary communications link between the Payment Server (100) and the Mobile 'Phone Billing System (110). However this type of approach presents some quite formidable implementation obstacles, which add substantial project delays and may even prevent the integration taking place at all.

In an embodiment of a still further aspect of the Invention, the solution is to employ the mechanisms that are conventionally used only for billing calls made by International Roaming mobiles or alternatively

the mechanisms used for billing a directly interconnected Operator. These mechanisms are briefly summarised in Section 1.1.6. There are two mechanisms for billing International Roamers, one for "post paid" or "credit" customers and one for "pre-paid" or "debit" customers. These techniques are well known. In either case the basic idea is the same, namely to use these mechanisms to create and send to the Mobile Operators a set of Call Detail Records, where the Records rather than referring to telephone calls refer to other products and services e.g. Parking Meter charges, vending machine charges etc.

The major advantage of this approach is that the Mobile Operator does not need to alter any of their existing systems and procedures. This reduces delays and other obstacles to implementation.

3 Claims

1. Generic Payment service accessed either by full telephone number or by shortened Service Access Code (IN) then enter beneficiary, amount and PIN.

2. Payment by dialled digits structured in the form: Service Access Code, Beneficiary Number/code, Amount, PIN number.

3. User can specify destination beneficiary by specifying telephone number.

4. User can specify amount payable by entering digits.

5. User can specify payment currency by using International Country Code.

6. Make a payment between two mobile 'phones using a service access code.

7. Generic Service Access code, invoking IN SCP node in mobile network and thus Payment Server.

8. Payment alternatively performed in two stages. In two stages: (a) Donor dials "729, Beneficiary #, Amount SEND", (b) Donor then receives confirmation of payment amount and is prompted to enter PIN. Donor then confirms by dialling X X X X (PIN) SEND.

9. In two separate stages, 729 SEND, Beneficiary, PIN

10. HLR provides proxy Authentication service to third party web sites.

11. Use of Adjunct switch and network-network interface to gain transaction charge for transactions made on Payment Server.

12. Use of Cell Location Information to allow shorter codes.

13. Use of Cell Location to prevent wrong numbers. Both users must be in the same Cell.

14. Make offline payments using mobile 'phone. Linking a mobile 'phone to a cash register to allow payment to be registered at the cash register.

15. Appended PIN/Password to verify source of Payment Received message.

16. Use of Location Information to allow the use of shorter Beneficiary identification numbers.

17. Logging onto web site by means of a number dialled onto a mobile phone rather than by entering a user name and password.

18. Paying for access to a web site by means of a a number dialled onto a mobile phone.

19. Paying for goods online by means of numbers dialled into a mobile 'phone.

20. Sending business cards by mobile 'phone.

Application No: GB 0031703.2 **Examiner:** Michael Logan
Claims searched: - **Date of search:** 4 May 2001

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.S): G4V (VAK)

Int Cl (Ed.7): G06F 17/60; G07F 7/00, 19/00;

Other: Online: WPI, EPODOC, JAPIO

Documents considered to be relevant:

Category	Identity of document and relevant passage		Relevant to claims
X	WO 00/60845 A2	(BELLSOUTH) whole document relevant	1
X	WO 99/66705 A1	(SOCIETE FRANCAISE) whole document relevant	1
X	WO 98/34203 A1	(QUALCOMM) see pages 6 and 7	1
X	WO 97/45814 A1	(VAZVAN) see page 6, lines 9-40	1
X	WO 96/32700 A1	(AU-SYSTEM) see page 12, lines 1-19	1

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
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